# Oracle® Solaris Cluster Data Service for Kerberos Guide

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# Contents

**Preface** ....5

1 **Installing and Configuring Oracle Solaris Cluster for Kerberos** .... 11

Oracle Solaris Cluster HA for Kerberos .... 11

Installing and Configuring Oracle Solaris Cluster HA for Kerberos .... 13

Configuring Oracle Solaris Cluster HA for Kerberos in Non-Global Zones .... 14

▼ How to Configure Oracle Solaris Cluster HA for Kerberos in Non-Global Zones .... 15

Installing Kerberos .... 16

▼ How to Install Kerberos .... 16

Installing the Oracle Solaris Cluster HA for Kerberos Packages .... 21

▼ How to Install the Oracle Solaris Cluster HA for Kerberos Packages .... 21

Registering and Configuring Oracle Solaris Cluster HA for Kerberos .... 23

▼ How to Register and Configure Oracle Solaris Cluster HA for Kerberos .... 23

▼ How to Configure the `HAStoragePlus` Resource Type .... 26

Tuning the Oracle Solaris Cluster HA for Kerberos Fault Monitor .... 27

Operations by the Fault Monitor During a Probe .... 28

Verifying Oracle Solaris Cluster HA for Kerberos Installation and Configuration .... 28

▼ How to Verify Oracle Solaris Cluster HA for Kerberos Installation and Configuration .... 28

A **Oracle Solaris Cluster HA for Kerberos Extension** .... 31

**Index** ....33

# Preface

*Oracle Solaris Cluster Data Service for Kerberos Guide* explains how to install and configure Oracle Solaris Cluster HA for Kerberos.

**Note –** This Oracle Solaris Cluster release supports systems that use the SPARC and x86 families of processor architectures: UltraSPARC, SPARC64, AMD64, and Intel 64. In this document, x86 refers to the larger family of 64-bit x86 compatible products. Information in this document pertains to all platforms unless otherwise specified.

This document is intended for system administrators with extensive knowledge of Oracle software and hardware. Do not use this document as a planning or presales guide. Before reading this document, you should have already determined your system requirements and purchased the appropriate equipment and software.

The instructions in this book assume knowledge of the Oracle Solaris Operating System and expertise with the volume-manager software that is used with Oracle Solaris Cluster software.

## Using UNIX Commands

This document contains information about commands that are specific to installing and configuring Oracle Solaris Cluster data services. The document does *not* contain comprehensive information about basic UNIX commands and procedures, such as shutting down the system, booting the system, and configuring devices. Information about basic UNIX commands and procedures is available from the following sources:

- Online documentation for the Oracle Solaris Operating System
- Oracle Solaris Operating System man pages
- Other software documentation that you received with your system

## Typographic Conventions

The following table describes the typographic conventions that are used in this book.

TABLE P–1 Typographic Conventions

| Typeface | Meaning | Example |
|---|---|---|
| `AaBbCc123` | The names of commands, files, and directories, and onscreen computer output | Edit your `.login` file.<br>Use `ls -a` to list all files.<br>`machine_name% you have mail.` |
| **`AaBbCc123`** | What you type, contrasted with onscreen computer output | `machine_name%` **`su`**<br>`Password:` |
| *aabbcc123* | Placeholder: replace with a real name or value | The command to remove a file is `rm` *filename*. |
| *AaBbCc123* | Book titles, new terms, and terms to be emphasized | Read Chapter 6 in the *User's Guide*.<br>A *cache* is a copy that is stored locally.<br>Do *not* save the file.<br>**Note:** Some emphasized items appear bold online. |

## Shell Prompts in Command Examples

The following table shows the default UNIX system prompt and superuser prompt for shells that are included in the Oracle Solaris OS. Note that the default system prompt that is displayed in command examples varies, depending on the Oracle Solaris release.

TABLE P–2 Shell Prompts

| Shell | Prompt |
|---|---|
| Bash shell, Korn shell, and Bourne shell | `$` |
| Bash shell, Korn shell, and Bourne shell for superuser | `#` |
| C shell | `machine_name%` |
| C shell for superuser | `machine_name#` |

## Related Documentation

Information about related Oracle Solaris Cluster topics is available in the documentation that is listed in the following table. All Oracle Solaris Cluster documentation is available at `http://docs.sun.com`.

| Topic | Documentation |
|---|---|
| Data service administration | *Oracle Solaris Cluster Data Services Planning and Administration Guide*<br>Individual data service guides |
| Concepts | *Oracle Solaris Cluster Concepts Guide* |
| Overview | *Oracle Solaris Cluster Overview* |
| Software installation | *Oracle Solaris Cluster Software Installation Guide* |
| System administration | *Oracle Solaris Cluster System Administration Guide* |
| Hardware administration | *Oracle Solaris Cluster 3.3 Hardware Administration Manual*<br>Individual hardware administration guides |
| Data service development | *Oracle Solaris Cluster Data Services Developer's Guide* |
| Error messages | *Oracle Solaris Cluster Error Messages Guide* |
| Command and function reference | *Oracle Solaris Cluster Reference Manual* |

For a complete list of Oracle Solaris Cluster documentation, see the release notes for your release of Oracle Solaris Cluster at `http://docs.sun.com`.

## Related Third-Party Web Site References

Third-party URLs that are referenced in this document provide additional related information.

**Note –** Oracle is not responsible for the availability of third-party web sites mentioned in this document. Oracle does not endorse and is not responsible or liable for any content, advertising, products, or other materials that are available on or through such sites or resources. Oracle will not be responsible or liable for any actual or alleged damage or loss caused or alleged to be caused by or in connection with use of or reliance on any such content, goods, or services that are available on or through such sites or resources.

## Documentation, Support, and Training

See the following web sites for additional resources:

- Documentation (`http://docs.sun.com`)
- Support (`http://www.oracle.com/us/support/systems/index.html`)
- Training (`http://education.oracle.com`) – Click the Sun link in the left navigation bar.

## Oracle Welcomes Your Comments

Oracle welcomes your comments and suggestions on the quality and usefulness of its documentation. If you find any errors or have any other suggestions for improvement, go to `http://docs.sun.com` and click Feedback. Indicate the title and part number of the documentation along with the chapter, section, and page number, if available. Please let us know if you want a reply.

Oracle Technology Network (`http://www.oracle.com/technetwork/index.html`) offers a range of resources related to Oracle software:

- Discuss technical problems and solutions on the Discussion Forums (`http://forums.oracle.com`).
- Get hands-on step-by-step tutorials with Oracle By Example (`http://www.oracle.com/technology/obe/start/index.html`).
- Download Sample Code (`http://www.oracle.com/technology/sample_code/index.html`).

## Getting Help

If you have problems installing or using Oracle Solaris Cluster, contact your service provider and provide the following information:

- Your name and email address (if available)
- Your company name, address, and phone number
- The model number and serial number of your systems
- The release number of the Oracle Solaris Operating System (for example, Oracle Solaris 10)
- The release number of Oracle Solaris Cluster (for example, Oracle Solaris Cluster 3.3)

Use the following commands to gather information about each node on your system for your service provider.

| Command | Function |
|---|---|
| `prtconf -v` | Displays the size of the system memory and reports information about peripheral devices |
| `psrinfo -v` | Displays information about processors |
| `showrev –p` | Reports which patches are installed |
| `prtdiag -v` | Displays system diagnostic information |
| `/usr/cluster/bin/clnode show-rev` | Displays Oracle Solaris Cluster release and package version information |

Also have available the contents of the `/var/adm/messages` file.

CHAPTER 1

# Installing and Configuring Oracle Solaris Cluster for Kerberos

This chapter describes the steps to install and configure the Oracle Solaris Cluster HA for Kerberos data service on Oracle Solaris Cluster servers.

This chapter contains the following sections:

- "Oracle Solaris Cluster HA for Kerberos" on page 11
- "Installing and Configuring Oracle Solaris Cluster HA for Kerberos" on page 13
- "Configuring Oracle Solaris Cluster HA for Kerberos in Non-Global Zones" on page 14
- "Installing Kerberos" on page 16
- "Installing the Oracle Solaris Cluster HA for Kerberos Packages" on page 21
- "Registering and Configuring Oracle Solaris Cluster HA for Kerberos" on page 23
- "Tuning the Oracle Solaris Cluster HA for Kerberos Fault Monitor" on page 27
- "Verifying Oracle Solaris Cluster HA for Kerberos Installation and Configuration" on page 28

## Oracle Solaris Cluster HA for Kerberos

You must configure Oracle Solaris Cluster HA for Kerberos as a failover data service. For conceptual information about failover data services, see Chapter 1, "Planning for Oracle Solaris Cluster Data Services," in *Oracle Solaris Cluster Data Services Planning and Administration Guide* and the *Oracle Solaris Cluster Concepts Guide*.

Kerberos servers have two daemons:

| | |
|---|---|
| `krb5kdc`(1M) | Authentication service |
| `kadmind`(1M) | Principal or policy administration service |

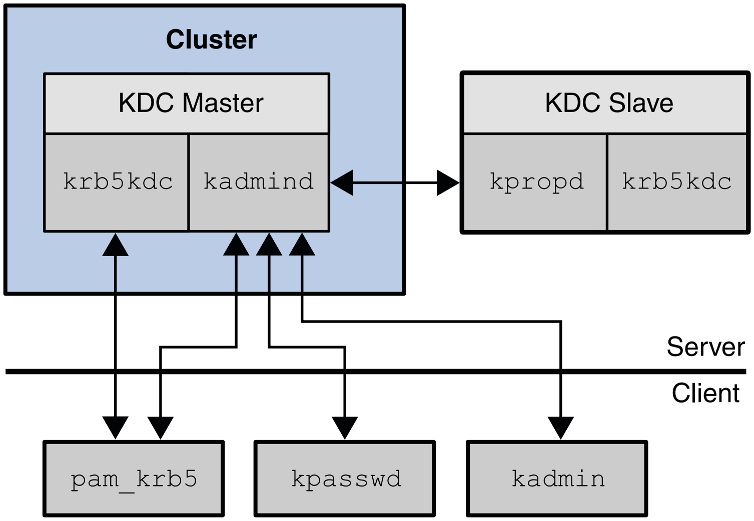
The `krb5kdc` daemon runs on both master and slave Key Distribution Center (KDC) servers. This service provides redundancy because an environment can have a master and one or more slaves that are running this process.

The kadmind daemon runs only on the master server and can handle requests that make updates to the principal/policy database. This single point of failure makes update requests more fragile than krb5kdc. By clustering the master KDC in the Kerberos environment you can provide update requests with greater availability.

For an introduction to Kerberos concepts, refer to Part VI, "Kerberos Service," in *System Administration Guide: Security Services*.

Figure 1–1 lists the Kerberos components of a Oracle Solaris Cluster environment.

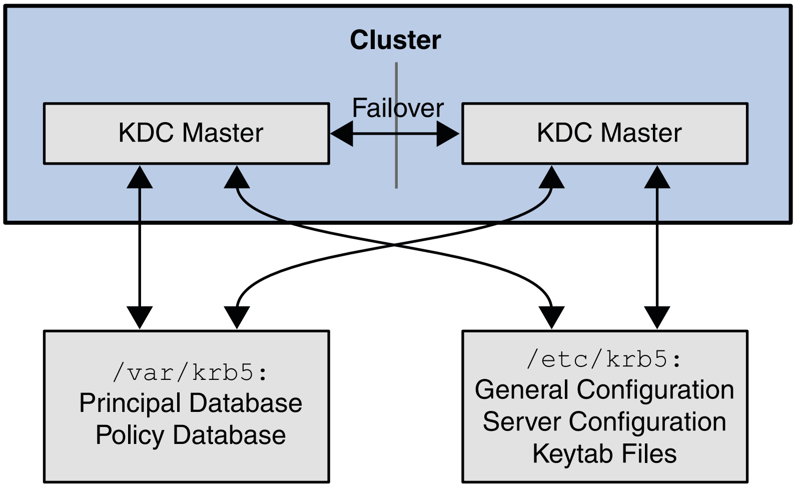
FIGURE 1–1 Kerberos Components in the Oracle Solaris Cluster Environment



In Figure 1–1, pam_krb5(5), kpasswd(1), kpropd(1M), and kadmin(1M) all send requests to kadmind directly. pam_krb5 and kpasswd make update requests when changing a users password. kadmin is used for general administration of the principal and policy database.

Figure 1–2 shows how databases and configuration information are shared between the cluster nodes and zones through a global or failover file system.

FIGURE 1–2 Database and Configuration Sharing



The configuration and keytab files are placed in `/etc/krb5`. The databases and logging files are kept under `/var/krb5`. By having these directories on a shared file system, you ensure that the database and configuration are identical. During failover, there should be little impact on client ticket requests, especially if there are slaves in the environment because slaves could be used to service client tickets during the failover period.

Clients that have already established sessions with `kadmind` by using the `kadmin` command are dropped after a failover on the cluster. Given the amount of privileges usually given for administrative principals, active `kadmin` sessions should not be left unattended. They should not run for an extended period of time. This means that `kadmin` session drops should not occur frequently because they are short lived processes.

# Installing and Configuring Oracle Solaris Cluster HA for Kerberos

Table 1–1 lists the tasks for installing and configuring Oracle Solaris Cluster HA for Kerberos. Perform these tasks in the order in which they are listed unless otherwise indicated.

**TABLE 1–1** Task Map: Installing and Configuring Oracle Solaris Cluster HA for Kerberos

| Task | Instructions |
|---|---|
| (Optional) Configure Oracle Solaris Cluster HA for Kerberos in Non-Global Zones | "Configuring Oracle Solaris Cluster HA for Kerberos in Non-Global Zones" on page 14 |
| Install Kerberos | "Installing Kerberos" on page 16 |
| Install Oracle Solaris Cluster HA for Kerberos packages | "Installing the Oracle Solaris Cluster HA for Kerberos Packages" on page 21 |
| Register and Configure Oracle Solaris Cluster HA for Kerberos | "Registering and Configuring Oracle Solaris Cluster HA for Kerberos" on page 23 |
| (Optional) Tune the Oracle Solaris Cluster HA for Kerberos fault monitor | "Tuning the Oracle Solaris Cluster HA for Kerberos Fault Monitor" on page 27 |
| Verify the Oracle Solaris Cluster HA for Kerberosinstallation and configuration | "Verifying Oracle Solaris Cluster HA for Kerberos Installation and Configuration" on page 28 |

## Configuring Oracle Solaris Cluster HA for Kerberos in Non-Global Zones

You can configure the Oracle Solaris Cluster HA for Kerberos service within a non-global zone on Solaris 10 and later versions of the operating system. Given that all the realm's keys are stored in the KDC's principal database, it is helpful to compartmentalize access to system resources, such as file systems, into a non-global zone.

**Note –** Oracle Solaris Cluster software allows you to create different zones on the same node in which to deploy the Kerberos failover resources, but to provide high availability, create the zones deploying Kerberos failover resources on different nodes.

**Note –** Kerberos data service is supported on a sparse root non-global zone.

## ▼ How to Configure Oracle Solaris Cluster HA for Kerberos in Non-Global Zones

Perform this procedure only if you want to configure the Oracle Solaris Cluster HA for Kerberos service within a non-global zone.

---

**Note –** Configuring the Oracle Solaris Cluster HA for Kerberos service in a global zone is similar to "Installing Kerberos" on page 16 on a node.

---

If you do not want to configure the Oracle Solaris Cluster HA for Kerberos service within a non-global zone, do not perform this procedure. Instead, go to "Installing Kerberos" on page 16.

This procedure is written for use on a global file system. In this procedure, the following parameters are used:

- Global zone: global
- Non-global zone: sparse_zone
- Global file system: `/global/fs`

● **Create the non-global zone directory and mount it from the global zone. Perform this on each of the cluster nodes.**

```
sparse_zone# mkdir -p /global/fs

global# zonecfg -z sparse_zone

    zonecfg:sparse_zone> add fs
    zonecfg:sparse_zone:fs> set dir=/global/fs
    zonecfg:sparse_zone:fs> set special=/global/fs
    zonecfg:sparse_zone:fs> set type=lofs
    zonecfg:sparse_zone:fs> end
    zonecfg:sparse_zone> verify
    zonecfg:sparse_zone> commit
    zonecfg:sparse_zone> exit

global# zoneadm -z sparse_zone reboot
```

Where */global/fs* is a global file system that has already been configured in the global zone.

---

**Note –** The non-global zone's path must be identical to the path of the global zone.

---

**Note –** To simplify cluster administration, use the same non-global zone name on each node, where resource groups are to be brought online in the non-global zone.

**Next Steps** When you have configured the file system on all the non-global zones, go to "How to Install Kerberos" on page 16. Perform the steps in that procedure in the non-global rather than the global zone.

# Installing Kerberos

This section describes the steps to install Kerberos and to enable Kerberos to run as Oracle Solaris Cluster HA for Kerberos.

Oracle Solaris Cluster HA for Kerberos uses the Kerberos server and mechanism libraries co-packaged with the Solaris 10 operating system or later versions of the operating system. See the `krb5.conf(4)` and `kdc.conf(4)` man pages for information on how to configure the Kerberos environment. The Oracle Solaris Cluster configuration for Kerberos differs from the Solaris configuration for Kerberos in the following ways:

- The Kerberos principal and policy databases are located on the cluster file system, not on a local file system. "How to Install Kerberos" on page 16 describes how to configure the server by using a global file system. However, the server can be configured with the `HAStoragePlus` file system if your environment is heavily loaded with write requests.
- A relocatable IP address, not the name of a physical host, identifies the name of a Kerberos server.

## ▼ How to Install Kerberos

In this procedure, the following parameters are used:

- Realm name = `EXAMPLE.COM`
- DNS domain name = `example.com`
- Cluster physical node names = `pkdc1.example.com` and `pkdc2.example.com`
- Cluster logical hostname = `kdc-1.example.com`

1. **Become superuser on a cluster member.**

2. **Choose the logical hostname that will provide the Kerberos service.**

   Select the logical hostname so that it corresponds to an IP address set up when you installed the Oracle Solaris Cluster software. See the *Oracle Solaris Cluster Concepts Guide* for details about logical hostnames.

3 **Create the `krb5.conf`, `kdc.conf`, and the other configuration files required to run a Kerberos server, then run the command `kdb5_util`(1M) as described in the Chapter 23, "Configuring the Kerberos Service (Tasks)," in *System Administration Guide: Security Services*.**

When populating the hostnames in these configuration files, ensure that they refer to the host's logical name, not the physical name.

---

**Note –** This detail ensures that applications running in the same zone as the logical hostname are configured to the corresponding IP addresses.

---

Here is an example of configuration files with the logical hostnames:

```
pkdc1# cat /etc/krb5/krb5.conf

[libdefaults]
         default_realm = EXAMPLE.COM

[realms]
       EXAMPLE.COM = {
               kdc = kdc-1.example.com
               admin_server = kdc-1.example.com
       }
[domain_realm]
       .example.com = EXAMPLE.COM
[logging]
       default = FILE:/var/krb5/kdc.log
       kdc = FILE:/var/krb5/kdc.log
       kdc_rotate = {
               period = 1d
               versions = 10
       }

[appdefaults]
       kinit = {
               renewable = true
               forwardable = true
       }

pkdc1# cat /etc/krb5/kdc.conf

[kdcdefaults]
         kdc_ports = 88,750

[realms]
         ACME.COM = {
                 profile = /etc/krb5/krb5.conf
                 database_name = /var/krb5/principal
                 admin_keytab = /etc/krb5/kadm5.keytab
                 acl_file = /etc/krb5/kadm5.acl
                 kadmind_port = 749
                 max_life = 8h 0m 0s
                 max_renewable_life = 7d 0h 0m 0s
                 default_principal_flags = +preauth
         }
```

Make sure that you also have a valid /etc/resolv.conf file and /etc/nsswitch.conf file configured, for example:

```
pkdc1# cat /etc/resolv.conf

domain example.com

nameserver 1.2.3.4

nameserver 1.2.3.5

pkdc1# grep dns nsswitch.conf

hosts:        files nis dns

ipnodes:      files nis dns
```

### 4 Create the KDC database by running the `kdb5_util(1M)`

```
 pkdc1# kdb5_util create

Initializing database '/var/krb5/principal' for realm 'EXAMPLE.COM',
master key name 'K/M@EXAMPLE.COM'
You will be prompted for the database Master Password.
It is important that you NOT FORGET this password.

Enter KDC database master key:<Type the new master key password>

Re-enter KDC database master key:<Type the above new master key password>
```

### 5 Add the following line in the `/etc/krb5/kadm5.acl` file:

```
sckrb5-probe/admin@EXAMPLE.COM i
```

Where:

| | |
|---|---|
| `EXAMPLE.COM` | Realm name chosen in Step 3 |
| i | The privilege that enables queries to the database for the `sckrb5-probe/admin` principal |

### 6 Start the `kadmin.local` command.

```
pkdc1# kadmin.local

Authenticating as principal host/admin@EXAMPLE.COM with password
```

a. **Use the `kadmin.local` command to add `kadmin` and `changepw` service principals for the fully qualified logical hostname for the cluster, `kdc-1.example.com`.**

```
kadmin.local: ank -randkey -allow_tgs_req kadmin/kdc-1.example.com

NOTICE: no policy specified for kadmin/kdc-1.example.com@EXAMPLE.COM;
assigning "default" Principal "kadmin/kdc-1.example.com@EXAMPLE.COM"
created.

kadmin.local: ank -randkey -allow_tgs_req +password_changing_service \
changepw/kdc-1.example.com
```

```
NOTICE: no policy specified for changepw/kdc-1.example.com@EXAMPLE.COM;
assigning "default"
Principal "changepw/kdc-1.example.com@EXAMPLE.COM" created.

kadmin.local: ktadd -k /etc/krb5/kadm5.keytab kadmin/kdc-1.example.com changepw/kdc-1.example.com
Entry for principal kadmin/kdc-1.example.com with kvno 3, encryption type AES-+ 128 CTS mode with \
96-bit SHA-1 HMAC added to keytab WRFILE:/etc/krb5/kadm5.keytab.
Entry for principal kadmin/kdc-1.example.com with kvno 3, encryption type Triple
DES cbc mode with HMAC/sha1 added to keytab WRFILE:/etc/krb5/kadm5.keytab.
Entry for principal kadmin/kdc-1.example.com with kvno 3, encryption type
ArcFour with HMAC/md5 added to keytab WRFILE:/etc/krb5/kadm5.keytab.
Entry for principal kadmin/kdc-1.example.com with kvno 3, encryption type
DES cbc mode with RSA-MD5 added to keytab WRFILE:/etc/krb5/kadm5.keytab.
Entry for principal changepw/kdc-1.example.com with kvno 3, encryption type
AES-128 CTS mode with 96-bit SHA-1 HMAC added to keytab WRFILE:/etc/krb5/kadm5.keytab.
Entry for principal changepw/kdc-1.example.com with kvno 3, encryption type
Triple DES cbc mode with HMAC/sha1 added to keytab WRFILE:/etc/krb5/kadm5.keytab.
Entry for principal changepw/kdc-1.example.com with kvno 3, encryption type
ArcFour with HMAC/md5 added to keytab WRFILE:/etc/krb5/kadm5.keytab.
Entry for principal changepw/kdc-1.example.com with kvno 3, encryption type
DES cbc mode with RSA-MD5 added to keytab WRFILE:/etc/krb5/kadm5.keytab.
```

b. **Add the new service principals for the host services for the fully qualified logical hostname for the cluster, `kdc-1.example.com`:**

```
kadmin.local: ank -randkey host/kdc-1.example.com
```

```
NOTICE: no policy specified for host/kdc-1.example.com@EXAMPLE.COM; assigning "default"
Principal "host/kdc-1.example.com@EXAMPLE.COM" created.
kadmin.local:  ktadd host/kdc-1.example.com
Entry for principal host/kdc-1.example.com with kvno 3, encryption type AES-128 CTS mode with 96-bit SHA-1 \
HMAC added to keytab WRFILE:/etc/krb5/krb5.keytab.
Entry for principal host/kdc-1.example.com with kvno 3, encryption type Triple DES cbc mode with HMAC/sha1 \
added to keytab WRFILE:/etc/krb5/krb5.keytab.
Entry for principal host/kdc-1.example.com with kvno 3, encryption type ArcFour with HMAC/md5 added to keytab \
WRFILE:/etc/krb5/krb5.keytab.
Entry for principal host/kdc-1.example.com with kvno 3, encryption type DES cbc mode with RSA-MD5 added to \
keytab WRFILE:/etc/krb5/krb5.keytab.
```

| | |
|---|---|
| `kdc-1.example.com` | Fully qualified logical hostname for the cluster |

c. **Add a new service principal for the kiprop service for the fully qualified logical hostname for the cluster, `kdc-1.example.com`.**

```
kadmin.local: ank -randkey kiprop/kdc-1.example.com
```

```
NOTICE: no policy specified for kiprop/kdc-1.example.com@EXAMPLE.COM; assigning "default"
Principal "kiprop/kdc-1.example.com@EXAMPLE.COM" created.
kadmin.local:  ktadd -k /etc/krb5/kadm5.keytab kiprop/kdc-1.example.com
Entry for principal kiprop/kdc-1.example.com with kvno 3, encryption type AES-128 CTS mode with 96-bit \
SHA-1 HMAC added to keytab WRFILE:/etc/krb5/kadm5.keytab.
Entry for principal kiprop/kdc-1.example.com with kvno 3, encryption type Triple DES cbc mode with HMAC/sha1 \
added to keytab WRFILE:/etc/krb5/kadm5.keytab.
Entry for principal kiprop/kdc-1.example.com with kvno 3, encryption type ArcFour with HMAC/md5 added to \
keytab WRFILE:/etc/krb5/kadm5.keytab.
Entry for principal kiprop/kdc-1.example.com with kvno 3, encryption type DES cbc mode with RSA-MD5 added \
to keytab WRFILE:/etc/krb5/kadm5.keytab.
```

7 **Move the `/etc/krb5` and `/var/krb5` directories to either a global or a failover file system.**

For example, move `/etc/krb5` and `/var/krb5` to a global file system, */global/fs/*, as follows:

```
pkdc1# mv /etc/krb5 /global/fs/krb-conf

pkdc1# mv /var/krb5 /global/fs/krb-db
```

See the *Oracle Solaris Cluster Software Installation Guide* for information on setting up cluster file systems.

8 **Create symbolic links back to the `/etc/krb5` and `/var/krb5` directories:**

```
pkdc1# ln -s /global/fs/krb-conf /etc/krb5

pkdc1# ln -s /global/fs/krb-db   /var/krb5
```

9 **Repeat the symbolic link creation on all the other cluster nodes or zones.**

```
pkdc2# mv /etc/krb5 /etc/krb5.old

pkdc2# mv /var/krb5 /var/krb5.old

pkdc2# ln -s /global/fs/krb-conf /etc/krb5

pkdc2# ln -s /global/fs/krb-db   /var/krb5
```

# Installing the Oracle Solaris Cluster HA for Kerberos Packages

If you did not install the Oracle Solaris Cluster HA for Kerberos packages during your initial Oracle Solaris Cluster installation, perform this procedure to install the packages. To install the packages, use the `installer` program.

---

**Note –** You need to install the Oracle Solaris Cluster HA for Kerberos packages in the global cluster and not in the zone cluster.

---

## ▼ How to Install the Oracle Solaris Cluster HA for Kerberos Packages

Perform this procedure on each cluster node where you are installing the Oracle Solaris Cluster HA for Kerberos packages.

You can run the `installer` program with a command-line interface (CLI) or with a graphical user interface (GUI). The content and sequence of instructions in the CLI and the GUI are similar.

---

**Note –** Even if you plan to configure this data service to run in non-global zones, install the packages for this data service in the global zone. The packages are propagated to any existing non-global zones and to any non-global zones that are created after you install the packages.

---

**Before You Begin** Ensure that you have the Oracle Solaris Cluster installation media.

If you intend to run the `installer` program with a GUI, ensure that your `DISPLAY` environment variable is set.

1. **On the cluster node where you are installing the data service packages, become superuser.**

2. **Load the Oracle Solaris Cluster installation media into the DVD-ROM drive.**

   If the Volume Management daemon `vold(1M)` is running and configured to manage DVD-ROM devices, the daemon automatically mounts the DVD-ROM on the `/cdrom` directory.

3. **Change to the installation wizard directory of the DVD-ROM.**

   - **If you are installing the data service packages on the SPARC platform, type the following command:**

     ```
     # cd /cdrom/dcrom0/Solaris_sparc
     ```

- **If you are installing the data service packages on the x86 platform, type the following command:**

  ```
  # cd /cdrom/dcrom0/Solaris_x86
  ```

4 **Start the installation wizard.**

```
# ./installer
```

5 **When you are prompted, accept the license agreement.**

6 **From the list of Oracle Solaris Cluster agents under Availability Services, select the data service for Kerberos.**

7 **If you require support for languages other than English, select the option to install multilingual packages.**

English language support is always installed.

8 **When prompted whether to configure the data service now or later, choose Configure Later.**

Choose Configure Later to perform the configuration after the installation.

9 **Follow the instructions on the screen to install the data service packages on the node.**

The installation wizard displays the status of the installation. When the installation is complete, the wizard displays an installation summary and the installation logs.

10 **(GUI only) If you do not want to register the product and receive product updates, deselect the Product Registration option.**

The Product Registration option is not available with the CLI. If you are running the installation wizard with the CLI, omit this step.

11 **Exit the installation wizard.**

12 **Unload the installation media from the DVD-ROM drive.**

a. **To ensure that the DVD-ROM is not being used, change to a directory that does *not* reside on the DVD-ROM.**

b. **Eject the DVD-ROM.**

```
# eject cdrom
```

**Next Steps** See “Registering and Configuring Oracle Solaris Cluster HA for Kerberos” on page 23 to register Oracle Solaris Cluster HA for Kerberos and to configure the cluster for the data service.

# Registering and Configuring Oracle Solaris Cluster HA for Kerberos

This section describes how to register and configure Oracle Solaris Cluster HA for Kerberos.

## ▼ How to Register and Configure Oracle Solaris Cluster HA for Kerberos

**Before You Begin** To perform this procedure, you need the following information about your configuration.

- The name of the resource type for Oracle Solaris Cluster HA for Kerberos. This name is `SUNW.krb5`.
- The names of the cluster nodes and the non-global zones on the nodes that master the data service.
- The network resource that clients use to access the data service. You normally set up this IP address when you install the cluster. See the *Oracle Solaris Cluster Concepts Guide* document for details on network resources.

**1 Become superuser on a cluster node.**

**2 Register the resource type for the data service.**

```
# clresourcetype register SUNW.krb5
```

**3 Create a resource group for the network and Kerberos resources to use.**

```
# clresourcegroup create [-n node[,...]] resource-group
```

`-n` *node[,...]* Specifies an optional comma-separated list of zones that can master this resource group. Each entry in this list has the format *node*. Where node is the node name and address and *zone* specifies the name of a non-global Solaris zone. To specify the global zone, or to specify a node without local zones, specify only *node*. These are the nodes or zones on which the data service can run. The order here determines the order in which the nodes or zones are considered as primary during failover. If all of the cluster nodes or zones are potential masters, you do not need to use the `-n` option.

This list is optional. If you omit this list, the global zone of each cluster node can master the resource group.

4 **Verify that all of the network resources that are to be used have been added to your name service database.**

You should have performed this verification during the Oracle Solaris Cluster installation. See the Chapter 1, "Planning the Oracle Solaris Cluster Configuration," in *Oracle Solaris Cluster Software Installation Guide* for details.

---

**Note –** To avoid any failures because of name service lookup, verify that all of the network resources are present in the server's and client's /etc/inet/hosts file. Configure name service mapping in the /etc/nsswitch.conf file on the servers to first check the local files before trying to access NIS or NIS+.

---

5 **Add a logical hostname to a resource group.**

```
# clreslogicalhostname create -g resource-group \
-h logical-hostname,[logical-hostname] \
[-N netif@node[,...]] lhresource
```

-g *resource-group*
: Specifies the name of the resource group. This name can be your choice but must be unique for a resource group within the cluster.

-h *logical-hostname*
: Specifies a comma-separated list of network resources (logical hostname or shared address).

-N *netif@node*[,...]
: Specifies an optional, comma-separated list that identifies the IP Networking Multipathing groups that are on each node. *netif* can be given as an IP Networking Multipathing group name, such as sc_ipmp0. The node can be identified by the node name or node ID, such as sc_ipmp0@1 or sc_ipmp@phys-schost-1. If you do not specify -N, the clreslogicalhostname command attempts to set the NetIfList property for you based on available IPMP groups or public adapters and the subnet associated with the HostnameList property.

*lhresource*
: Specifies the logical hostname resource to be created in the associated resource group.

---

**Note –** If you require a fully qualified hostname, you must specify the fully qualified name with the -h option and you cannot use the fully qualified form in the resource name.

---

---

**Note –** Oracle Solaris Cluster does not currently support the use of adapter names for *netif*.

---

6 **Add a Kerberos application resource to the resource group.**

```
# clresource create  -g resource-group -t SUNW.krb5 \
[-p Network_resources_used=network-resource, ...] \
[-p Port_list=port-number/protocol] resource
```

`-p` Network_resources_used=*network-resource*, ...
Specifies a comma-separated list of network resources (logical hostnames or shared addresses) that Kerberos will use. If you do not specify this property, the value defaults to all of the network resources that are contained in the resource group.

`-p` Port_list=*port-number/protocol*
Specifies a port number and the protocol to be used. If you do not specify this property, the value defaults to `88/tcp,749/tcp,88/udp`.

`-t` SUNW.krb5
Specifies the name of the resource type to which this resource belongs. This entry is required.

resource
Specifies the name of the resource to be associated with the resource type `SUNW.krb5`.

The resource is created in the enabled state.

7 **Bring the resource group online:**

```
# clresourcegroup online -M resource-group
```

### Example 1–1 Registering Failover Oracle Solaris Cluster HA for Kerberos

The following example shows how to register Oracle Solaris Cluster HA for Kerberos on a two-node cluster. At the end of this example, the `clresourcegroup` command starts Oracle Solaris Cluster HA for Kerberos.

This example uses the following configuration parameters:

| | |
|---|---|
| Cluster physical node names | `pkdc1.example.com` and `pkdc2.example.com`:sparse_zone<br>**Note –** Kerberos is hosted in the global zone on `pkdc1.example.com` and in the non-global zone “sparse_zone” on `pkdc2.example.com`. |
| Cluster logical hostname | `kdc-1.example.com` |
| Resource group | `krb-rg` (for all of the resources) |
| Resources | `kdc-1` (logical hostname) and `krb-rs` (Kerberos application resource) |

1. Register the Kerberos resource type.

```
# clresourcetype register SUNW.krb5
```

2. Create the resource group to contain all of the resources.

```
# clresourcegroup create -n pkdc1.example.com, pkdc2.example.com:sparse_zone krb-rg
```

3. Add the logical hostname resource to the resource group.

```
# clreslogicalhostname create -g krb-rg -h kdc-1 kdc-1
```

4. Add a Kerberos application resource to the resource group.

```
# clresource create -g krb-rg -t SUNW.krb5 krb-rs
```

5. Bring the failover resource group online.

```
# clresourcegroup online -M krb-rg
```

## ▼ How to Configure the `HAStoragePlus` Resource Type

This procedure describes how to configures the `HAStoragePlus` resource type. This resource type synchronizes actions between `HAStorage` and Oracle Solaris Cluster HA for Kerberos and enables you to use a highly available local file system. It is, however, recommended that you use a global file system rather than using `HAStoragePlus` because Oracle Solaris Cluster HA for Kerberos is not disk-intensive in most environments.

See "Relationship Between Resource Groups and Device Groups" in *Oracle Solaris Cluster Data Services Planning and Administration Guide* for background information.

This procedure uses the following configuration parameters:

- Cluster physical node names = `pkdc1.example.com` and `pkdc2.example.com`:sparse_zone
- Cluster logical hostname = `kdc-1.example.com`
- Resource group = krb-rg
- Kerberos application resource = krb-rs
- `HAStoragePlus` resource = krb-hasp-rs
- Logical hostname resource = kdc-1
- Device group associated with the file system:`/global/dg1`

---

**Note –** The `/global/dg1` file system contains the `krb-db` and `krb-conf` directories which have symbolic links that point to `/var/krb5` and `/etc/krb5` respectively.

---

1 **Register the Kerberos resource type.**

```
# clresourcetype register SUNW.krb5
```

2 **Create a resource group.**

```
# clresourcegroup create -n pkdc1.example.com, pkdc2.example.com:sparse_zone krb-rg
```

3 **Add the logical hostname resource to the resource group.**

```
# clreslogicalhostname create -g krb-rg -h kdc-1
```

4 **Add the Kerberos application resource to the resource group.**

```
# clresource create -g krb-rg -t SUNW.krb5 krb-rs
```

5 **Register the `HAStoragePlus` resource type**

```
# clresourcetype register SUNW.HAStoragePlus
```

6 **Add the `HAStoragePlus` resource to the resource group.**

```
# clresource create -g krb-rg -t SUNW.HAStoragePlus \
-p FilesystemMounPoints=/global/dg1 \
-p AffinityOn=TRUE krb-hasp-rs
```

7 **Bring the failover resource group online.**

```
# clresourcegroup online -M krb-rg
```

# Tuning the Oracle Solaris Cluster HA for Kerberos Fault Monitor

The Oracle Solaris Cluster HA for Kerberos fault monitor is contained in the resource that represents Kerberos. You create this resource when you register and configure Oracle Solaris Cluster HA for Kerberos. For more information, see "Registering and Configuring Oracle Solaris Cluster HA for Kerberos" on page 23.

System properties and extension properties of this resource control the behavior of the fault monitor. The default values of these properties determine the preset behavior of the fault monitor. The preset behavior should be suitable for most Oracle Solaris Cluster installations. Therefore, you should tune the Oracle Solaris Cluster HA for Kerberos fault monitor *only* if you need to modify this preset behavior.

Tuning the Oracle Solaris Cluster HA for Kerberos fault monitor involves the following tasks:

- Setting the interval between fault monitor probes
- Setting the timeout for fault monitor probes
- Defining the criteria for persistent faults
- Specifying the failover behavior of a resource

Perform these tasks when you register and configure Oracle Solaris Cluster HA for Kerberos. For more information, see the following sections:

- "Registering and Configuring Oracle Solaris Cluster HA for Kerberos" on page 23
- "Tuning Fault Monitors for Oracle Solaris Cluster Data Services" in *Oracle Solaris Cluster Data Services Planning and Administration Guide*

The information that you need to tune the"Registering and Configuring Oracle Solaris Cluster HA for Kerberos" on page 23 fault monitor is provided in the follow subsection.

## Operations by the Fault Monitor During a Probe

The probing consists of checking to see if `kadmind`(1M) and `krb5kdc`(1M) are listening to their respective ports. During more thorough probing a new principal is created, the principal is authenticated, and then this principal fetches itself from the database to test the administrative daemon, `kadmind`.

The probe executes the following steps.

1. Probe the ports for `kadmind`(1M) and `krb5kdc`(1M) to make sure that they are listening. Run the probe command by using the time-out value that the resource property `Probe_timeout` specifies. The probe is run every `Cheap_probe_interval`, which by default is every 30 seconds.
2. Every `Thorough_probe_interval` (by default 300 seconds) `kadmin.local`(1M) is used to add a principal. The probe then performs a `kinit`(1) with the newly created principal. The probe uses the newly created principal to run `kadmin`(1M) to retrieve its record from the principal database.
3. The result of these probe commands can be either fail or succeed. If Kerberos successfully responds, the probe returns to its infinite loop, waiting for the next probe time.

   If the probe fails, the probe considers this scenario a failure of the Kerberos data service and records the failure in its history. The Kerberos probe considers every failure a complete failure.
4. Based on the success or failure history, a failure can cause a local restart or a data service failover. Refer to “Tuning Fault Monitors for Oracle Solaris Cluster Data Services” in *Oracle Solaris Cluster Data Services Planning and Administration Guide* for further details.

# Verifying Oracle Solaris Cluster HA for Kerberos Installation and Configuration

Verify that you have correctly installed and configured Oracle Solaris Cluster HA for Kerberos.

## ▼ How to Verify Oracle Solaris Cluster HA for Kerberos Installation and Configuration

1 **Configure a Kerberos client to authenticate the newly created server as described in “Configuring Kerberos Clients” in *System Administration Guide: Security Services*.**

When referencing the server in the client's configuration file, `/etc/krb5/krb5.conf`, specify the logical hostname of the server. An example of this name could be `kdc-1.example.com`.

**2 After the client is configured, test the authentication of a user principal by using `kinit(1)`.**

```
# kinit user_name

Password for user_name@realm_name:
```

*user_name* A user principal that you created previously

*realm_name* Indicates the realm name that was previously configured in the Kerberos environment.

You return to the shell prompt without any error message being output to the terminal.

**3 Test the Kerberos administration service.**

```
# kadmin -p administrative_principal_name

Authenticating as principal administrative_principal_name@realm_name with password.
    Password for administrative_principal_name@realm_name:
    kadmin:  quit
```

*administrative_principal_name* An administrative principal that you had previously created.

*realm_name* Indicates the realm name that was previously configured in the Kerberos environment.

You return to the shell prompt without any error message being output to the terminal.

APPENDIX A

# Oracle Solaris Cluster HA for Kerberos Extension

You do not have to specify extension properties when creating a Kerberos resource. To configure extension properties when you create a resource, use the `-p` option of the `clresourcegroup`(1CL) command. To configure extension properties at a later stage, perform the procedures in Chapter 2, "Administering Data Service Resources," in *Oracle Solaris Cluster Data Services Planning and Administration Guide*. For information about all of the Oracle Solaris Cluster properties, see Appendix A, "Standard Properties," in *Oracle Solaris Cluster Data Services Planning and Administration Guide*.

For details about system-defined properties, see the `r_properties`(5) man page and the `rg_properties`(5) man page.

The `SUNW.krb5` resource type represents the Kerberos application in a Oracle Solaris Cluster configuration. The extension properties of this resource type are as follows:

`Monitor_retry_count`

Controls fault-monitor restarts. The property indicates the number of times that the process monitor facility restarts the fault monitor. The property corresponds to the `-n` option passed to the `pmfadm`(1M) command. The Resource Group Manager (RGM) counts the number of restarts in a specified time window. See the `Monitor_retry_interval` property for more information. Note that `Monitor_retry_count` refers to the restarts of the fault monitor itself, not to the Kerberos daemon.

| | |
|---|---|
| **Data type** | Integer |
| **Default** | 4 |
| **Range** | Not applicable |
| **Tunable** | Anytime |

`Monitor_retry_interval`

Indicates the time window in minutes during which the RGM counts fault-monitor failures. The property corresponds to the `-t` option passed to the `pmfadm`(1M) command. If the number of times the fault monitor fails exceeds the value of the `Monitor_retry_count` property, the process monitor facility does not restart the fault monitor.

| | |
|---|---|
| **Data type** | Integer |
| **Default** | 2 minutes |
| **Range** | Not applicable |
| **Tunable** | Anytime |

`Probe_timeout`

Probe_timeout

| | |
|---|---|
| **Data type** | Integer |
| **Default** | 90 seconds |
| **Range** | Not applicable |
| **Tunable** | Anytime |

# Index

**C**

`clnode` command, 9

commands, node information, 8

**E**

extension properties, Sun Cluster HA for Kerberos, 31

**F**

failover data service, Oracle Solaris Cluster HA for Kerberos, 11–13

fault monitors

- Oracle Solaris Cluster HA for Kerberos
  - resource type for, 27
- tuning, 27

**G**

global zone, 21

**H**

help, 8–9

**I**

installing

- Kerberos, 16–20
- Oracle Solaris Cluster HA for Kerberos, 21–22

introduction, Oracle Solaris Cluster HA for Kerberos, 11–13

**K**

`kadmind`, administration service, 11

Kerberos, installing, 16–20

Kerberos application, fault monitor, 27

`krb5kdc`, authentication service, 11

**L**

local zones, *See* non-global zones

**M**

`messages` file, 9

`Monitor_retry_count` extension property, `SUNW.krb5` resource type, 31

`Monitor_retry_interval` extension property, `SUNW.krb5` resource type, 31

**N**

non-global zones, 21

**O**

Oracle Solaris Cluster HA for Kerberos
- failover data service, 11–13
- fault monitor, 27
- installing, 21–22
- introduction, 11–13
- software packages, installing, 21–22
- task map, 14

**P**

packages, 21–22
Probe_timeout extension property
- SUNW.krb5 resource type, 32

prtconf -v command, 9
prtdiag -v command, 9
psrinfo -v command, 9

**R**

resource types, fault monitors, 27
restrictions, zones, 21

**S**

show-rev subcommand, 9
showrev –p command, 9
software packages, 21–22
Sun Cluster HA for Kerberos, extension properties, 31
system properties, effect on fault monitors, 27

**T**

task map, Oracle Solaris Cluster HA for Kerberos, 14
technical support, 8–9
tuning, fault monitors, 27

**V**

/var/adm/messages file, 9

**Z**

zones, 21